established landward of all digitized shorelines and 37 transect lines were erected perpendicular to the baseline at 500-foot spacings for purposes of measuring and calculating the various shoreline changes (Figure 3.2). A second baseline, also shown on Figure 3.2 (inlet baseline), was established by constructing a line from a stable reference position on Bogue Banks extending across the inlet to Hammocks Beach. The inlet baseline was utilized for purposes of measuring and calculating ebb channel midpoint changes, inlet width along the baseline, and shoulder changes associated with ebb channel migration. The location of the mid-point and axis of the ebb channel were digitized for purposes of tracking the temporal and spatial changes in the position and orientation of the ebb channel within the inlet system. The inlet minimum width, a conventional parameter, was also measured at the narrowest portion of the throat. The surface area of ebb tidal delta seaward of the inlet baseline was also calculated by digitizing the areal extent of shoals as defined by the zone of breaking waves. Some of the more pertinent results of the geomorphic analysis are presented below. Complete details of the geomorphic analysis are reported in Appendix A.

3.2. Ebb Channel Orientation. The orientation and position of main ebb channel has changed repeatedly over time. Over the past four decades the orientation of the outer bar channel has ranged from 143° in February 1984 to 185° in March 1999. Note that an orientation of approximately 160° is perpendicular to the general alignment of the shorelines on the two adjacent islands. The movement and orientation of the outer segment of the main ebb channel coupled with the migration of the landward segments of the channel have dictated much of the contemporary and historic shoreline change patterns along both shoulders and oceanfront shorelines. Figure 3.3 shows the change in the orientation of the ebb channel during the December 1973 to September 2001 analysis period.

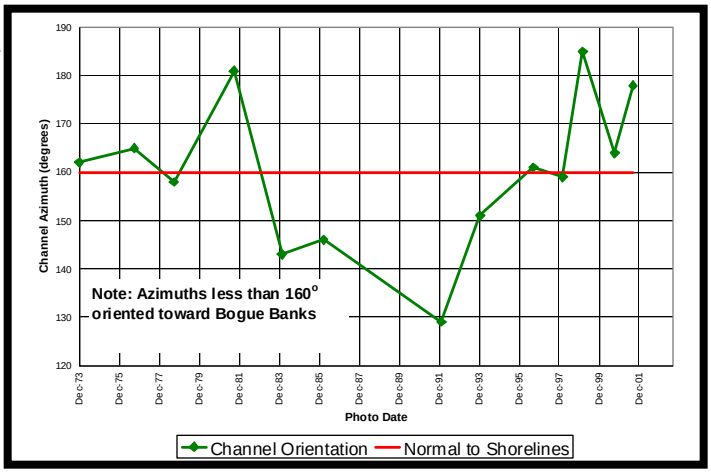

Figure 3.3 Orientation of Bogue Inlet Bar Channel (1973 – 2001)

3.3. Movement of the Ebb Channel. Compilation of data derived from digitized aerial photographs indicates that during the period 1973–2001, the ebb channel moved a net distance of 2,117 feet in an easterly direction (see Figures 3.4 to 3.6). Between December 1973 and September 1976 the ebb channel moved 1,543 feet in a westerly

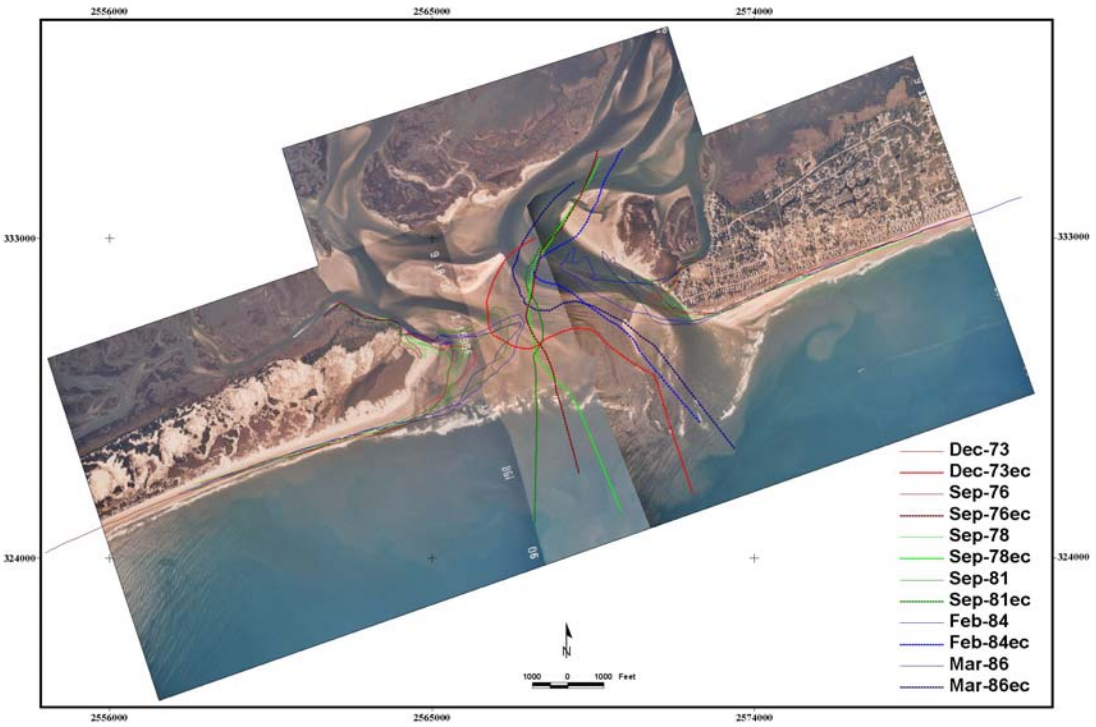

Figure 3.4 Ebb Channel and Shoreline Positions
December 1973 to March 1986

direction toward Bear Island. Over the next five years, between September 1976 and September 1981, the channel continued to move toward Bear Island (west) a distance 352 feet. Aerial photographs document the reorientation and repositioning of the ebb channel during a breaching event that occurred by mid 1975 (Figure 3.7). A small spillover channel imaged on the April 1974 aerial photograph steadily enlarged, and by September of 1974, it was well established as a major feature. The newly formed ebb channel became the dominant pathway for ebb flow by September 1976 (Figure 3.7). Between 1976, when the ebb channel was in a shore normal configuration, and September 1981, the throat section of the ebb channel remained in approximately the same position (Figure 3.7). Figure 3.7 illustrates that although the interior portion of the channel remained relatively stable, the channel's outer portion was deflected toward Bear Island.

3.4. The interior or throat segment of the main ebb channel began its eastward trek in 1981/82 while the seaward segment of the channel was still skewed toward Bear Island. 1982 photographs, became the site of an incipient secondary ebb channel by June 1984. During this period of initial reconfiguration of the inlet channels and shoals, a large complex spit began to develop on the Bogue Banks shoulder. Rapid spit growth on both shoulders resulted in severe constriction of the inlet throat. In February 1984 the minimum width of the inlet narrowed to 1,586 feet and the width of the inlet measured

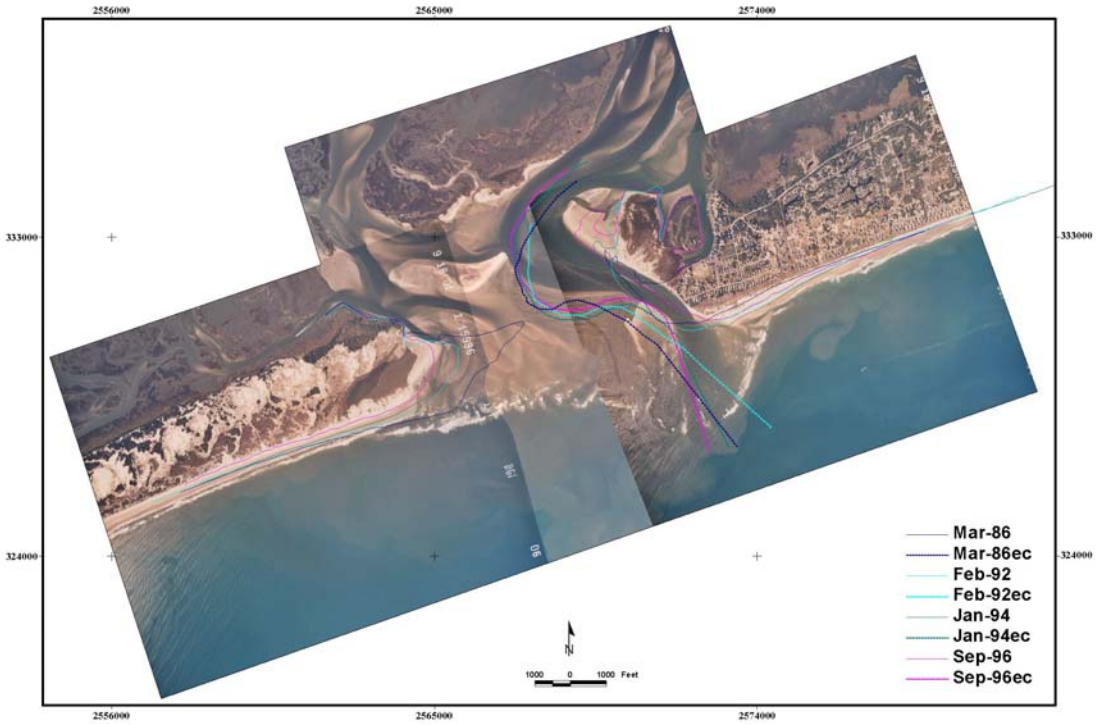

Figure 3.5 Ebb Channel and Shoreline Positions
March 1986 to September 1996

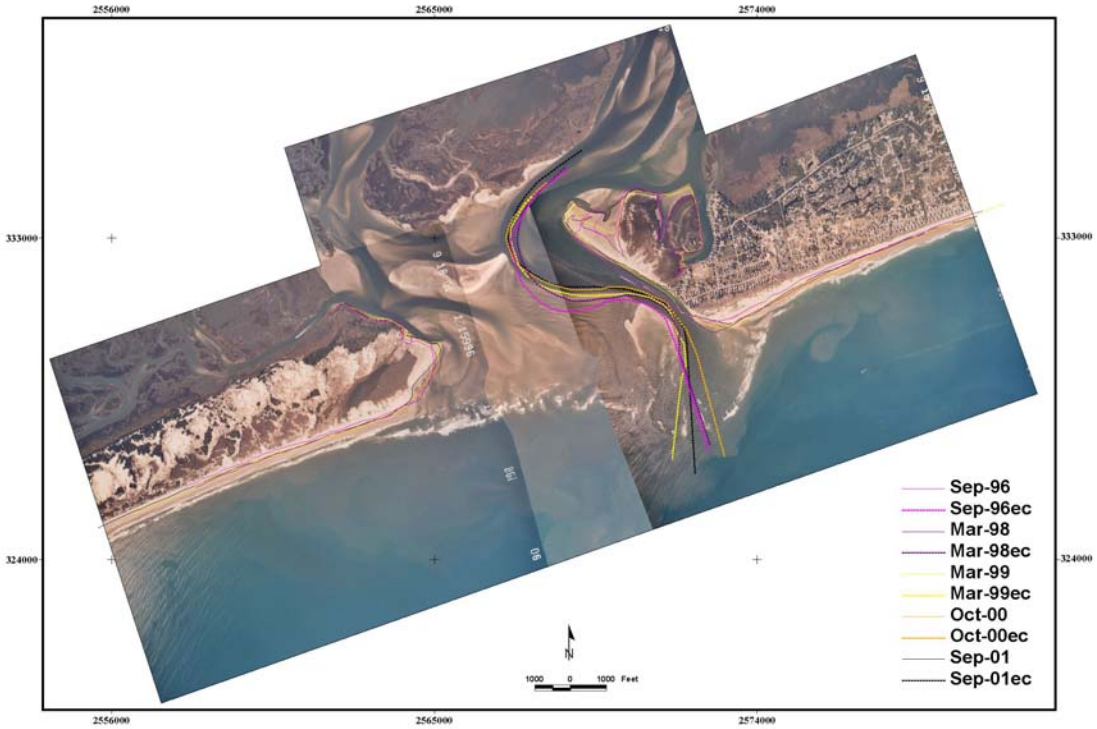

Figure 3.6 Ebb Channel and Shoreline Positions
September 1996 to September 2001